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(54) Laminated Structures

(57) A PVC-impregnated textile fabric carcase, particularly a solid woven conveyor belting fabric, is coated with a normally PVC-incompatible synthetic rubber facing layer such as polychloroprene by means of a fire resistant nitrile rubber adhesive compound, the rubber facing layer incorporating a minor proportion of a disintegrating agent comprising a material compatible with the synthetic rubber, but which on exposure to heating above 100°C causes breakdown of the rubber matrix.

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readily. It follows that a good disintegrating agent for present purposes may itself be flammable, even where the end product incorporating it must pass a relatively severe fire test.

CLAIMS

1. A pvc-impregnated textile fabric coated with a normally pvc-incompatible synthetic rubber facing layer by means of a nitrile rubber interlayer, wherein the synthetic rubber includes a minor proportion of a disintegrating agent comprising a material which is compatible with the synthetic rubber but which on exposure to heating above 100°C causes breakdown of the rubber matrix.

2. A fabric according to claim 1 wherein the synthetic rubber facing layer includes from 1 to 20 parts by weight per 100 parts of the rubber polymer of a disintegrating agent compatible with the rubber, but which an exposure to heating in the range 100 to 200°C causes breakdown of the rubber matrix.

3. A fabric according to claim 1 or 2 wherein the synthetic rubber is a polychloroprene and the disintegrating agent is selected from chlorinated polyethylene, high styrene resins, ethylene vinyl acetate copolymers and aromatic hydrocarbon resins.

4. A fabric according to claim 1 or claim 2 wherein the synthetic rubber is a chlorosulphonated polyethylene.

5. A conveyor belting comprised of the fabric of any preceding claim.

6. Conveyor belting substantially as hereinbefore described with reference to the example.

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SPECIFICATION

Improvements in and Relating to Laminate Structures

This invention relates to laminate structures in which one polymeric material is employed to provide a different polymeric material with a surface or surface layer of desired physical and/or chemical properties. In particular it relates to providing a polyvinylchloride (PVC)—coated substrate with a rubber layer.

Our copending UK patent application No. 8311409 describes a method of providing a pvc-coated substrate with a surface layer of a normally pvc-incompatible rubber by a process comprising applying to the substrate a thin layer of uncured, preferably fire resistant nitrile rubber adhesive compound followed by applying a cover layer of uncured, normally pvc-incompatible rubber and thereafter subjecting the resultant laminate to a curing treatment.

The process is particularly useful for making pvc conveyor belting having at least one facing layer of synthetic rubber such as a polychloroprene rubber. The belting may be solid woven, or plied.

Whilst the products of the process just described are extremely satisfactory in terms of excellent bond strength between the layers, certain applications call for compliance with fire resistance tests.

One such test is the "drum friction test" designed to assess the behaviour of a conveyor belt under stalling conditions. The test which is described in B.S. 3289, comprises subjecting a stationary length of belt to the action of a simulated driving drum which is rotated against the belt surface. High frictional heating results and the test specifies amongst other things that a satisfactory belt shall not glow, under the test conditions, before it breaks.

Conveyor belting with PVC covers readily passes this test, but this is not the case with rubber covered belting. A solution to the problem has been proposed in the Specification of Patent No. 1310291 in which a thermoplastic layer is interposed between a pvc-impregnated belting carcase and a nitrile rubber surface layer. Frictional heating under drum friction test conditions melts the thermoplastic interlayer, causing the belt to de-laminate. The nitrile rubber peels off and leaves the pvc-based carcase to break in the usual way, without glowing.

If an elastomeric adhesive interlayer is employed, giving high interlaminar bond strength [illegible] ging the method

[illegible] according to the present invention a pvc impregnated textile fabric carcase coated with a normally-pvc incompatible synthetic rubber facing layer by means of a fire resistant nitrile rubber adhesive compound includes in said rubber facing [illegible] proportion of a distintegrating agent [illegible] is compatible with the synthetic rubber but which on exposure to heating above 100°C causes breakdown of the rubber matrix. Breakdown preferably takes place below 200°C, well below the glow temperature of the facing rubber. "Minor proportion" preferably means from 1 to 20 parts per 100 parts by weight of the synthetic rubber, as otherwise the desirable properties of the latter may be unduly affected by the presence of the distintegrating agent.

Suitable disintegrating agents include various thermoplastics resins such as chlorinated polyethylene, high styrene resins, ethylene vinyl acetate copolymers and aromatic hydrocarbon resins.

In assessing suitability it will usually be necessary to carry out experiments, since the precise amount of disintegrating agent needed for a particular synthetic rubber is not readily predictable.

Preferred synthetic rubbers are the polychloroprenes such as "Neoprene" and chlorosulphonated polyethylenes such as "Hypalon".

It is normally essential to achieve a proper balance between conflicting test specifications for the end product; for example, the product may pass the drum friction test, only to fail other tests described in British Standard 3289 or to be deficient in other properties such as abrasion resistance or coefficient of friction which are critical for satisfactory service.

In order that the invention be better understood an example of it will now be given by way of illustration.

EXAMPLE

A cotton/nylon solid woven belting carcase was impregnated with pvc plastisol using the process of UK patent No. 2036818. A 0.3 mm layer of uncured fire-resistant nitrile rubber adhesive compound was applied to each surface of this carcase, by calendering. A 2 mm sheet of uncured polychloroprene rubber ("Neoprene" GRT) was applied to each nitrile rubber layer prior to consolidating/curing the assembly in a conventional belting press at 160°C. The polychloroprene rubber was a conventional carbon black reinforced, abrasion resistant compound, and included material for conferring fire resistance. It also included 10 parts (per 100 parts of polychloroprene) by weight of a disintegrating agent, in this particular case an ethylene vinyl acetate copolymer, sold under the brand Elvax 360.

The resulting belting exhibited excellent [illegible] GKN [illegible]

[illegible] friction test, the synthetic rubber matrix broke down at about 180°C, as a result of the inclusion of the disintegrating agent. This was followed rapidly by breaking of the belt, without flame or even glow. This was especially surprising in view of the fact that Elvax 360 itself burns quite